Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

Beal Lake Conservation Area

2016 Annual Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

September 2018

Work conducted under LCR MSCP Work Task E1

Lower Colorado River Multi-Species Conservation Program Steering Committee Members

Federal Participant Group

Bureau of Reclamation
U.S. Fish and Wildlife Service
National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

Arizona Participant Group

Arizona Department of Water Resources
Arizona Electric Power Cooperative, Inc.
Arizona Game and Fish Department
Arizona Power Authority
Central Arizona Water Conservation District
Cibola Valley Irrigation and Drainage District
City of Bullhead City
City of Lake Havasu City
City of Mesa
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City of Yuma
Electrical District No. 3, Pinal County, Arizona
Golden Shores Water Conservation District
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Mohave Valley Irrigation and Drainage District
Mohave Water Conservation District
North Gila Valley Irrigation and Drainage District
Town of Fredonia
Town of Thatcher
Town of Wickenburg
Salt River Project Agricultural Improvement and Power District
Unit "B" Irrigation and Drainage District
Wellton-Mohawk Irrigation and Drainage District
Yuma County Water Users' Association
Yuma Irrigation District
Yuma Mesa Irrigation and Drainage District

Other Interested Parties Participant Group

QuadState Local Governments Authority
Desert Wildlife Unlimited

California Participant Group

California Department of Fish and Wildlife
City of Needles
Coachella Valley Water District
Colorado River Board of California
Bard Water District
Imperial Irrigation District
Los Angeles Department of Water and Power
Palo Verde Irrigation District
San Diego County Water Authority
Southern California Edison Company
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The Metropolitan Water District of Southern California

Nevada Participant Group

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Nevada Department of Wildlife
Southern Nevada Water Authority
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Native American Participant Group

Hualapai Tribe
Colorado River Indian Tribes
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Conservation Participant Group

Ducks Unlimited
Lower Colorado River RC&D Area, Inc.
The Nature Conservancy

Lower Colorado River
Multi-Species Conservation Program

Beal Lake Conservation Area

2016 Annual Report

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ACRONYMS AND ABBREVIATIONS

BLCA	Beal Lake Conservation Area
FY	fiscal year
Havasu NWR	Havasu National Wildlife Refuge
HCP	Habitat Conservation Plan
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
lidar	light detection and ranging
pH	the acidity or basicity (alkalinity) of an aqueous solution
PIT	passive integrated transponder
Reclamation	Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service

Symbols

°C	degrees Celsius
mg/L	milligram(s) per liter
µS/cm	microsiemens per centimeter

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1.0 INTRODUCTION

The purpose of this annual report is to summarize all activities that have occurred at the Beal Lake Conservation Area (BLCA) from October 1, 2015, through September 30, 2016, which is Federal fiscal year (FY) 2016. Water usage is presented for the calendar year, January 1 through December 31, 2016, consistent with the Colorado River Accounting and Water Use Report: Arizona, California, and Nevada, Calendar Year 2016 (Bureau of Reclamation [Reclamation] 2017).

1.1 Background

Reclamation's Lower Colorado Regional Office, in partnership with the Havasu National Wildlife Refuge (Havasu NWR), initiated the backwater improvement project at Beal Lake and subsequently riparian restoration to meet the conditions of compliance set forth by the 1997 Biological and Conference Opinion issued by the U.S. Fish and Wildlife Service (USFWS) under the guidance of the Endangered Species Act. The riparian area was initially used to test and demonstrate restoration and management techniques.

In 2001, Beal Lake was dredged to create a refuge for native fishes. The dredge material was distributed over the adjacent area to be planted with native riparian vegetation. The riparian restoration area was constructed in two phases: the first started in 2002 and the second in 2004. Details of the plantings in each field can be found in the 2005 annual report (Reclamation 2005). The project area, which is divided into fields that can be independently irrigated and managed, was designed to provide an area to test various riparian restoration methods and techniques for site preparation, planting, irrigation, monitoring, managing, and maintenance.

As the test fields grew into established stands of native trees, several Lower Colorado River Multi-Species Conservation Program (LCR MSCP) targeted species began to inhabit the site, and in April 2010, the site was approved as the BLCA by the program's Steering Committee. The BLCA contributes approximately 116 acres of the Fremont cottonwood-Goodding's willow (*Populus fremontii-Salix gooddingii*) (hereafter cottonwood-willow), marsh, honey mesquite (*Prosopis glandulosa*), and screwbean mesquite (*Prosopis pubescens*) land cover types toward the acreage goals of the LCR MSCP, and it continues to contribute valuable information about restoration techniques and management practices.

2.0 CONSERVATION AREA INFORMATION

2.1 Purpose

The BLCA was developed both for native fishes and terrestrial wildlife species. The lake is intended to be managed for razorback suckers (*Xyrauchen texanus*) and bonytail (*Gila elegans*) and is a continuation of the commitment to construct habitat for native fishes under the 1997 Biological and Conference Opinion. It does not provide creditable land cover acreage to the LCR MSCP. The riparian restoration area provides habitat for a variety of avian and small mammal species and provides creditable land cover type acreage to the program. Irrigation cycles for the riparian restoration area are evaluated annually to determine if conditions are appropriate for the species targeted by the LCR MSCP, specifically the southwestern willow flycatcher (*Empidonax trailii extimus*).

2.2 Location

The BLCA is located in Reach 3, between the Colorado River and Topock Marsh, on the Havasu NWR, near Needles, California. It is within the historic flood plain of the lower Colorado River and adjacent to River Mile 237 on the Arizona side (figure 1).

2.3 Landownership

The BLCA is located on the Havasu NWR, which is owned and managed by the USFWS.

2.4 Water

The BLCA receives water from the Havasu NWR's 2nd and 3rd priority water entitlement provided by the 1964 Supreme Court Decree in *Arizona* v. *California* and by U.S. Department of the Interior Secretarial reservation. The Havasu NWR's entitlement of 37,339 acre-feet per year consumptive use and 41,839 acre-feet diversionary right of Colorado River water is used to fill Topock Marsh through two instrumented inlet canals. The water used for irrigation at the BLCA is supplied from Topock Marsh.

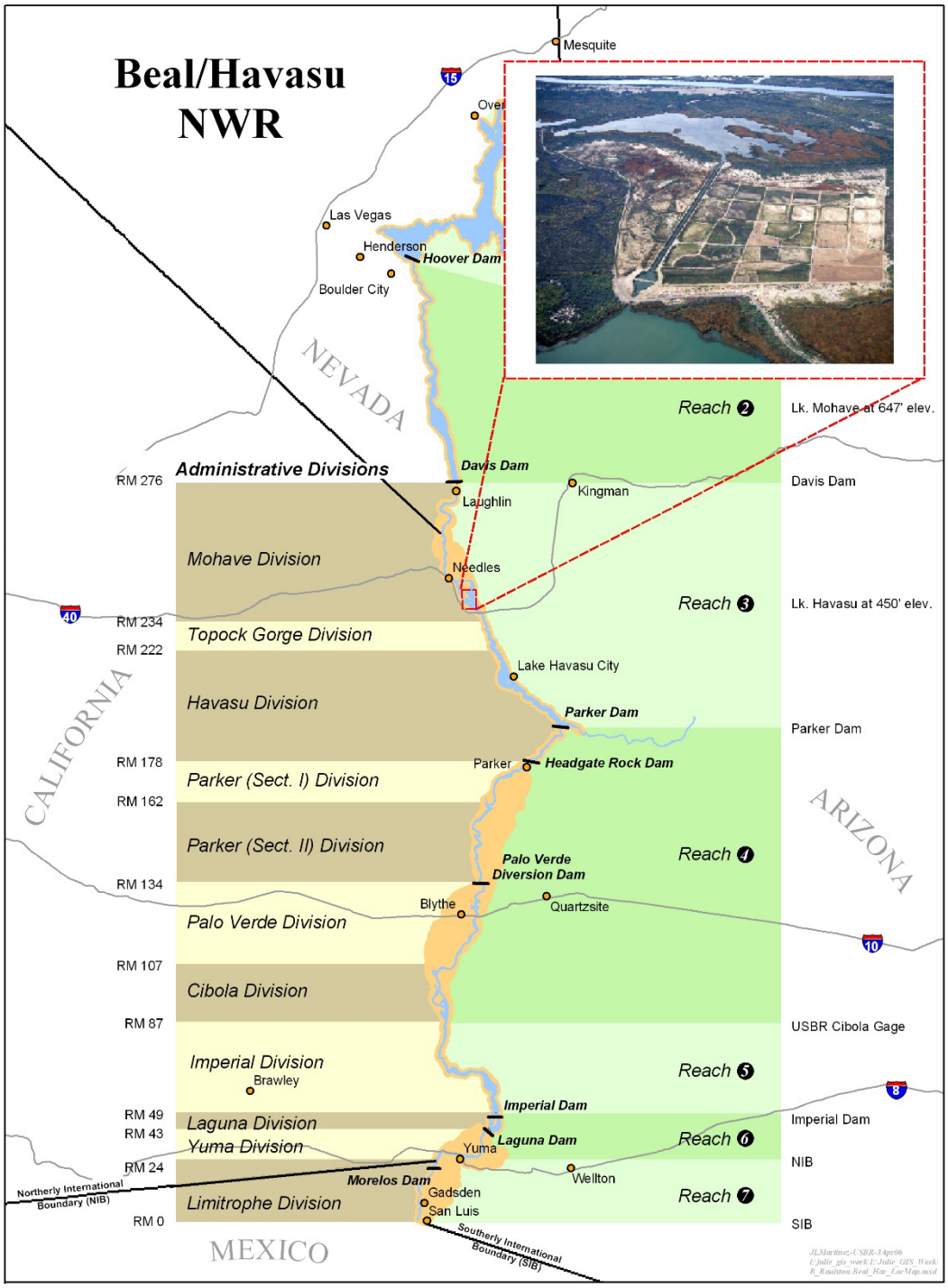


Figure 1.—Location of the BLCA.

2.5 Agreements

A Land Use Agreement was signed in 2010 by Reclamation and the USFWS to secure land and water for the BLCA for the remainder of the 50-year LCR MSCP. The agreement outlines the rights and responsibilities of each partner in the project's development and maintenance.

2.6 Public Use

The BLCA is in an area that was closed to the public by the USFWS prior to becoming a conservation area; it remains closed to the public.

2.7 Law Enforcement

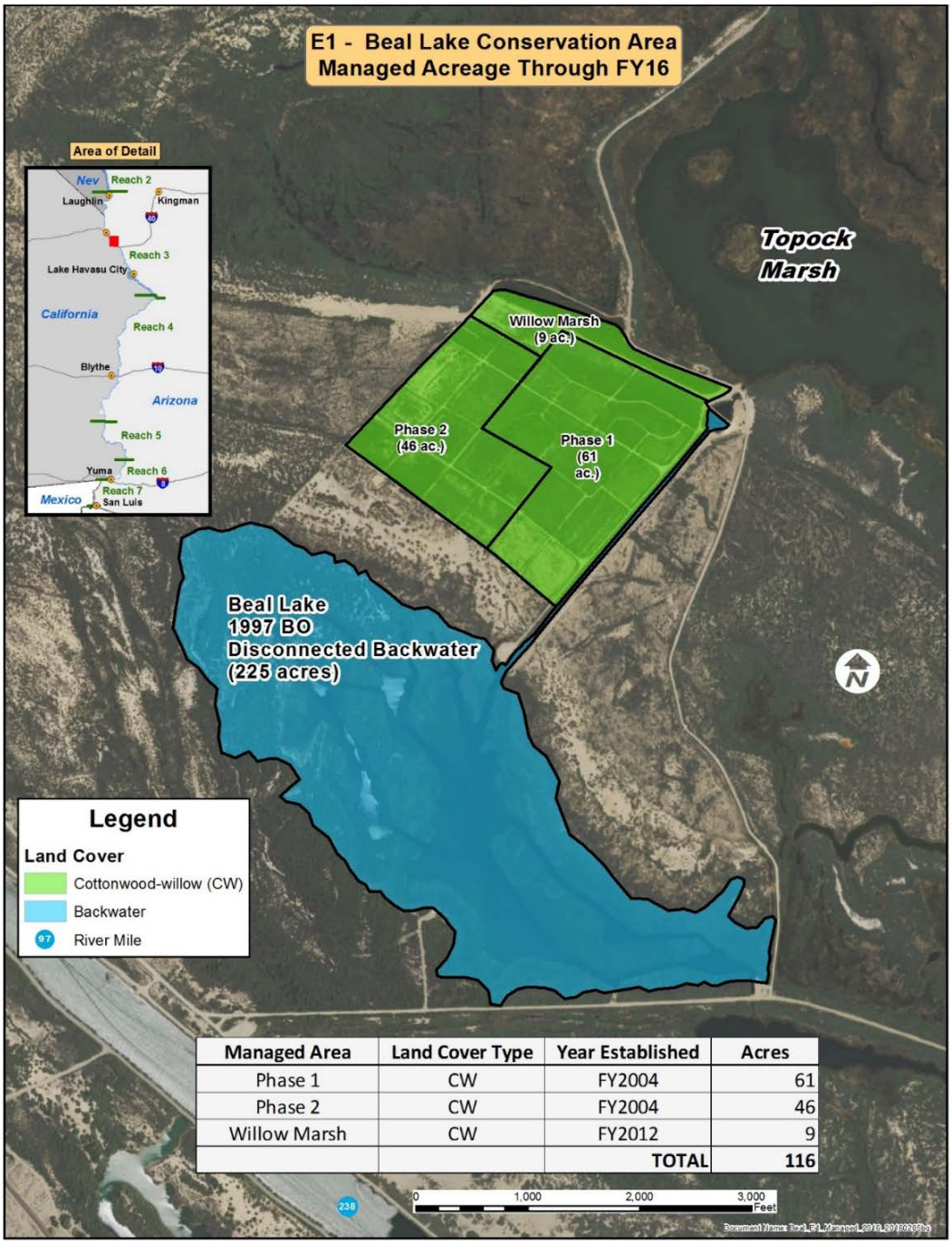
Law enforcement activities at the BLCA are performed primarily by the USFWS's law enforcement officer under the LCR MSCP's site-specific Fire Management & Law Enforcement Strategy (LCR MSCP 2010). Additional local law enforcement assistance is available through the Arizona Game and Fish Department's Kingman Office, the Mohave County Sherrif's Office, and the Bureau of Land Management's Lake Havasu Field Office.

2.8 Wildfire Management

The USFWS will provide an appropriate management response to all wildfires that occur within the BLCA. The full range of suppression strategies is available to managers provided that selected options do not compromise firefighter and public safety, are cost effective, consider the benefits of suppression and the values to be protected, and are consistent with resource objectives (LCR MSCP 2010).

3.0 HABITAT DEVELOPMENT AND MANAGEMENT

Figure 2 shows the established land cover types that are being managed for LCR MSCP covered species.



Managed Area	Land Cover Type	Year Established	Acres
Phase 1	CW	FY2004	61
Phase 2	CW	FY2004	46
Willow Marsh	CW	FY2012	9
		TOTAL	116

Figure 2.—BLCA managed acreage through FY16.

3.1 Planting

No field preparation, planting, or fertilizing was conducted at the BLCA in FY16.

3.2 Irrigation

The fields at the BLCA are independently flood irrigated from one alfalfa valve positioned in a corner of each field (figure 3). The fields are irrigated on a schedule that prioritizes establishing newly planted vegetation, creating microclimate conditions for LCR MSCP species, and preventing salts from accumulating in the soil. Fields recently planted or seeded with native vegetation are irrigated on a weekly basis, while fields with established stands of trees are either frequently irrigated to create microclimate conditions for covered species or are put on a reduced irrigation schedule to merely keep salts from accumulating in the soil.

Figure 3.—Overview of the BLCA.

The groundwater at the BLCA fluctuates both seasonally and spatially throughout the site. In summer, groundwater elevations at the BLCA are shallow, generally ranging between 2 and 8 feet below the ground surface when groundwater elevations are high due to high riverflows and higher elevations in Topock Marsh. Given the shallow water table, established stands of native trees have access to groundwater and, therefore, require irrigation only to keep soil salinity levels from increasing over time.

During the 2016 irrigation season, 1,132 acre-feet of water was applied to the BLCA riparian fields compared to 907 acre-feet in 2015. The 200-acre-foot increase from the previous year is due, in part, to in-the-field irrigation schedule adjustments made to Cells EE and KK.

An irrigation schedule (figure 4) is prepared prior to each growing season. As the growing season progresses, small changes are made to benefit resource conservation. Rain, temperature, humidity level, groundwater elevation, etc., factor into weekly irrigation management.

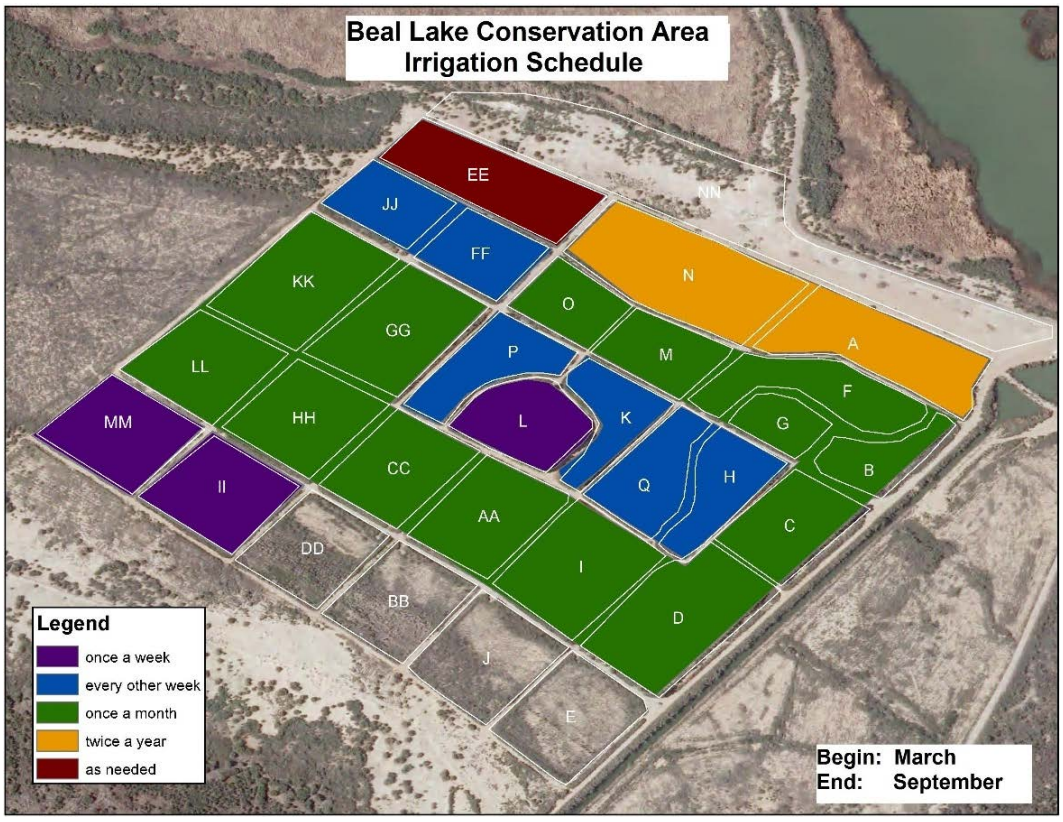


Figure 4.—FY16 irrigation schedule for the BLCA.

3.3 Site Management

Irrigation, maintenance, and cleaning of the wedge-wire screens were conducted at the BLCA from mid-March through mid-September. Routine maintenance (oil changes, fuel filters, fueling, etc.) was performed on the irrigation pump throughout the year. The fertilizer pump was not used in FY16.

In February 2016, a drawdown of Beal Lake was conducted, and salinity monitoring occurred. During the drawdown, all eight 0.6-millimeter wedge-wire screens on the Beal Lake rock structure were removed and cleaned, and four were reinstalled. Permanent removal of the four downstream (Beal Lake side) wedge-wire screens on the rock structure was completed. A cage to exclude small mammals was installed on the end of the culverts, and clean screens were reconnected on the upstream (Topock Marsh) side of the culverts. The four wedge-wire screens are removed, cleaned, and swapped annually to assist with Beal Lake's water surface elevation management. The screens not in use are stored at the Beal Lake maintenance yard. Routine scrubbing of the screens occurred every other week during the irrigation season.

Annual rains and vehicle usage typically degrade the existing roads, so equipment and road base must be hauled in to maintain suitable driving conditions. Road resurfacing and improvements were conducted within the BLCA and along the levee road. In addition, the north and south boat ramps at Beal Lake were cleared of vegetation and graded with road base to allow for ease of access.

4.0 MONITORING

4.1 Backwater Monitoring

Beal Lake monitoring information is used to estimate native fish abundance, characterize fish species composition in the lake, and measure habitat and water quality parameters. These data are intended to be used to help guide management of the lake for native fishes.

4.1.1 Native Fishes

Beal Lake is managed cooperatively by the USFWS Arizona Fish and Wildlife Conservation Office in Parker, Arizona, and the LCR MSCP. The lake is intended to provide habitat for razorback suckers and bonytail, and a variety of techniques and gear types are used annually to sample and monitor native fish populations.

4.1.1.1 Fish Stocking

No native fishes were stocked in FY16. Native fish stockings have been suspended at Beal Lake since 2013 because of the detection of toxic golden algae (*Prymnesium parvum*).

4.1.1.2 Fish Monitoring

Beal Lake has been occupied by a variety of native and non-native fish species. Fisheries monitoring is traditionally accomplished through remote passive integrated transponder (PIT) tag scanning and an annual winter survey. The annual survey is used to evaluate the health of the native fishes, look for signs of recruitment, and assess the relative abundance of non-native fishes at this site. In order to fully evaluate the various sizes and year-classes of the multiple species present, a variety of techniques and gear types are used, which may include trammel nets, hoop nets, minnow traps, electrofishing, and remote PIT tag scanning.

No fisheries monitoring activities were conducted in FY16. A suite of non-native fishes currently occupy the lake; however, no native fishes are known to be present following the large fishkill that occurred in early March 2013. Routine fisheries monitoring will resume following future native fish stockings.

4.1.1.2.1 Native Fish Populations

No native fishes have been detected following the March 2013 fishkill. Beal Lake is presumed to be devoid of native fishes at this time.

4.1.2 Water Quality

Four permanent sampling stations (WQ 2, 4, 5-5, and 6) have been equipped with multi-parameter water quality probes since May 2010. These stations are positioned throughout the lake, and their associated probes are deployed at a depth of approximately 1 meter below the water surface. The multi-parameter probes are programmed to record the water temperature in degrees Celsius (°C), dissolved oxygen in milligrams per liter (mg/L), conductivity in microsiemens per centimeter (µS/cm), and pH twice each day. The measurements are recorded at 12-hour intervals, with the first reading occurring within 1 hour of sunrise and the second in late afternoon; this timing allows for daily minimums and maximums of temperature and dissolved oxygen to be recorded. The start times for the first recording of the day are adjusted monthly to account for seasonal shifts in sunrise. Water quality parameters within the lake have rarely exceeded the known thresholds for native fishes.

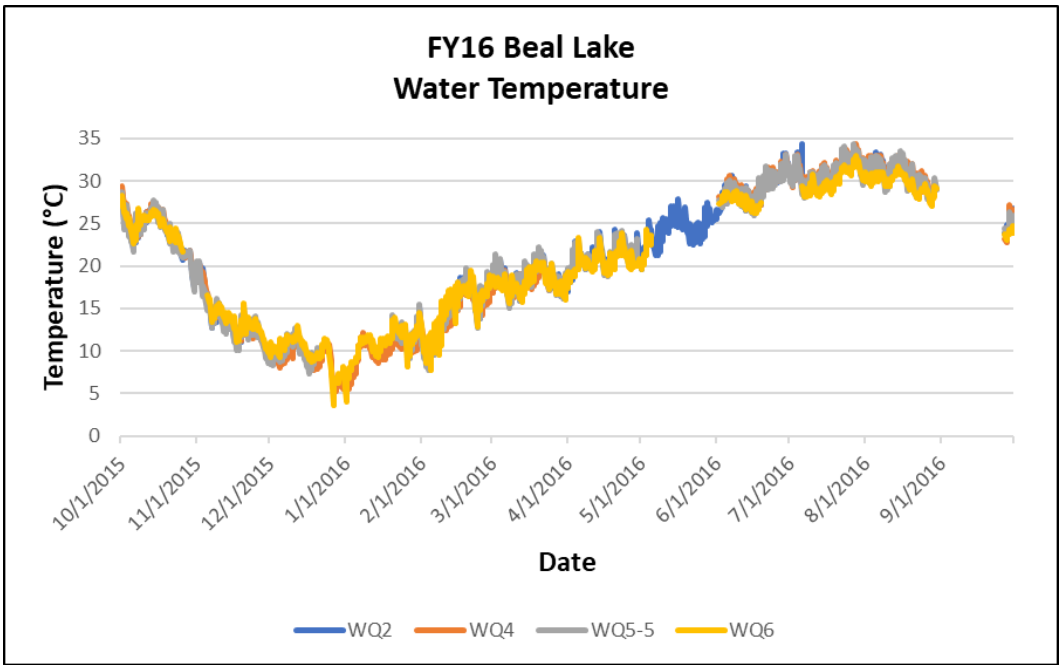


Figure 5.—Beal Lake water temperature, FY16.

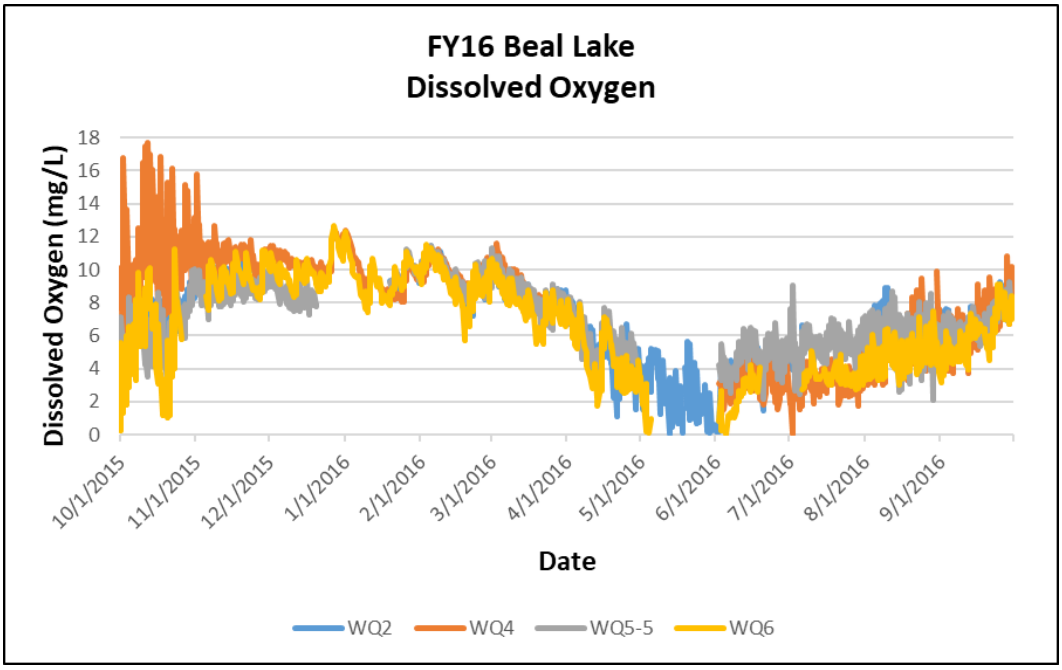


Figure 6.—Beal Lake dissolved oxygen, FY16.

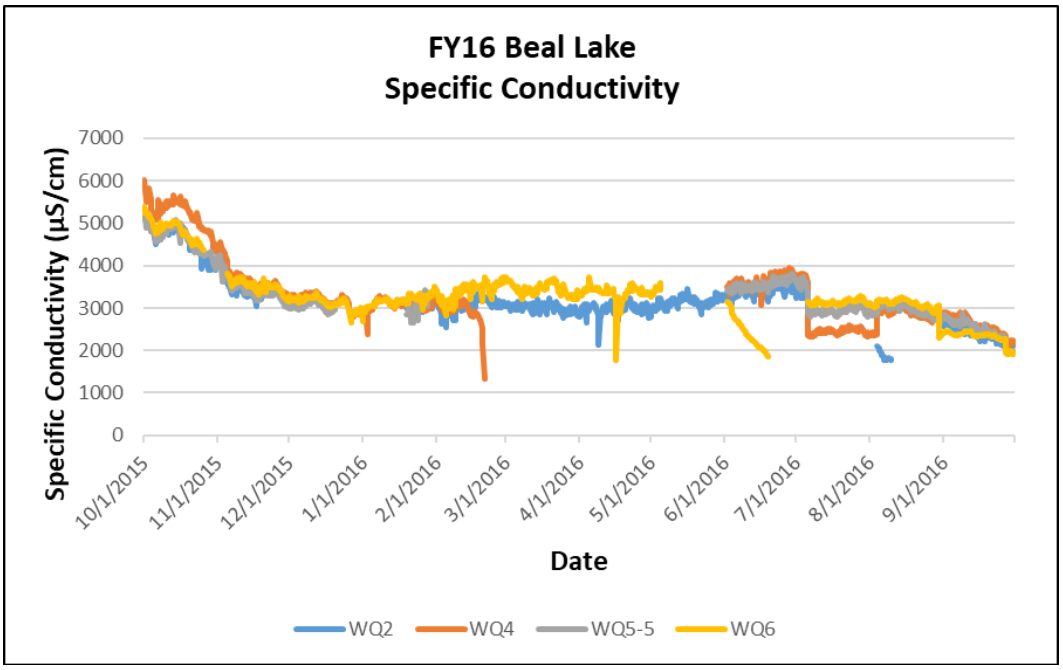


Figure 7.—Beal Lake specific conductivity, FY16.

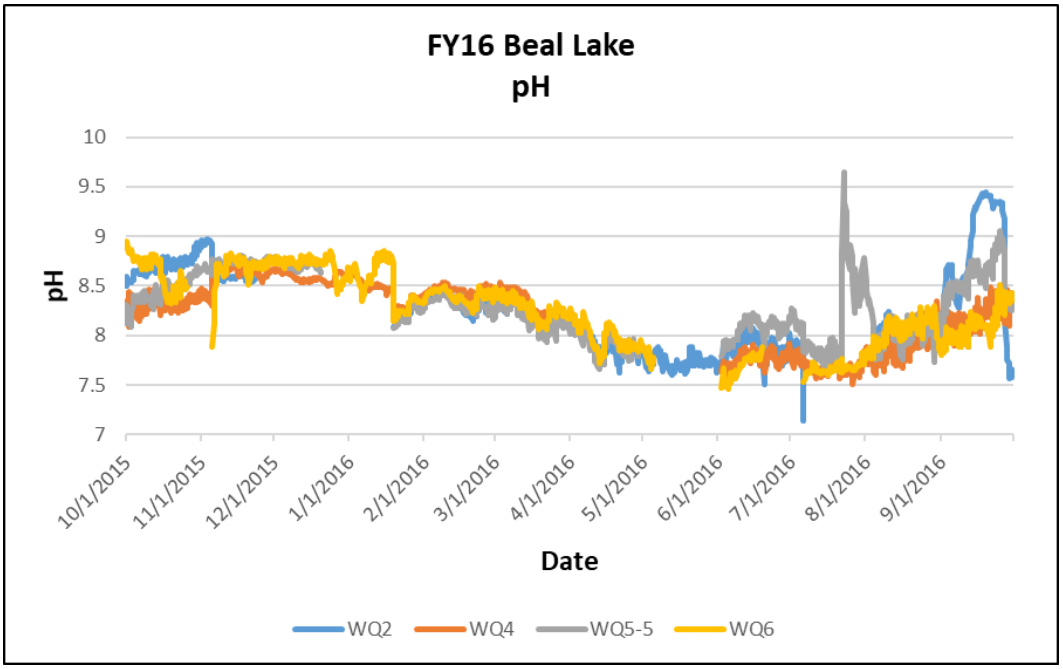


Figure 8.—Beal Lake pH, FY16.

Daily and annual cycling of water quality parameters in the lake were documented throughout FY16 (figures 5–8). Conductivity in Beal Lake trended downward during FY16, decreasing to approximately 2,200 µS/cm by the end of the reporting period (figure 7). This decrease is largely due to the increased maintenance of pond screens. The remaining water quality parameters were observed to be within expected seasonal and annual ranges.

4.1.3 Phytoplankton and Zooplankton

Monitoring for phytoplankton and zooplankton was conducted quarterly throughout the year, and all samples were collected at the four established water quality sampling stations. Samples were collected from the entire water column and analyzed for relative abundance and total biomass. Abundance and biomass estimates for both phytoplankton and zooplankton were found to be relatively low for backwater lake environments; however, these results are consistent and comparable to other backwater habitats in the region. Abundance and biomass estimates continue to be relatively stable on an annual basis, with only moderate seasonal variability observed through sample analyses.

4.2 Avian Monitoring

Avian monitoring in FY16 included surveys for southwestern willow flycatchers, yellow-billed cuckoos (*Coccyzus americanus occidentalis*), marsh birds, and riparian breeding birds as well as bird migration monitoring at a Monitoring Avian Productivity and Survivorship Station.

4.2.1 Southwestern Willow Flycatcher Surveys

Surveys to detect the presence of southwestern willow flycatchers were conducted five times during FY16 in cottonwood-willow habitat. No breeding or resident southwestern willow flycatchers were detected. Most birds detected after June 24 or individuals detected repeatedly before June 24 are considered to be southwestern willow flycatchers. Birds detected before June 24 and those detected only once after June 24 are considered migrant willow flycatchers (McLeod and Pellegrini 2017).

One male southwestern willow flycatcher was detected on June 28. This individual vocalized in response to call-playback at a few survey points and then sang at a slow rate for about 20 minutes following cessation of playback; the overall determination was that this individual was not highly territorial. No southwestern willow flycatchers were detected on any of three subsequent monitoring visits, and this individual was determined not to be a resident. The BLCA is considered occupied in 2016 because the detection occurred between June 24 and July 20.

4.2.2 Yellow-billed Cuckoo Surveys

Four surveys for yellow-billed cuckoos were conducted within the riparian portion of the BLCA. During the first survey period (approximately June 15 – June 29), there were three cuckoo detections. During the second survey period (approximately June 30 – July 13), there were three cuckoo detections. During the third survey period (approximately July 14 – July 27), there were two cuckoo detections. During the fourth survey period (approximately July 28 – August 10), there were two cuckoo detections.

Breeding was not confirmed at the BLCA in FY16. There was one probable yellow-billed cuckoo territory at the BLCA (Parametrix Inc., and Southern Sierra Research Station 2016). Due to the behavior of this species, detections alone do not indicate the number of cuckoos present, nor do detections confirm breeding. The number, timing, and location of detections, along with behaviors observed, may be used to estimate abundance, distribution, and/or breeding status. Counts of possible, probable, and confirmed breeding territories were used and not the number of breeding pairs. Territory estimates represented two adults associated with a single nest.

4.2.3 Marsh Bird Surveys

Presence surveys for California black rails (*Laterallus jamaicensis coturniculus*), western least bitterns (*Ixobrychus exilis hesperis*), Virginia rails (*Rallus limicola*), and Yuma clapper rails (*Rallus longirostris yumanensis* [also known as Yuma Ridgway's rail = *R. obsoletus yumanensis*]) were conducted in marsh habitat at the BLCA in three survey sessions during March and April. There were three detections of western least bitterns during the first survey session (March 18 and 31). There were 11 detections of western least bitterns and 4 detections of Yuma clapper rails during the second survey session (April 8). There were 11 detections of western least bitterns and 3 detections of Yuma clapper rails during the third survey session (April 27) (Ronning and Kahl 2017).

4.2.4 General Avian Surveys

Bird surveys were conducted to detect breeding LCR MSCP riparian bird species and other territorial riparian bird species. Surveys were conducted within areas of the cottonwood-willow and honey mesquite land cover types that were of adequate growth to support breeding birds. General bird surveys resulted in the detection of 18 species (101.25 territories) of birds breeding within the surveyed plots. Arizona bell's vireos (*Vireo bellii arizonae*), Sonoran yellow warblers (*Dendroica petechia sonorana = Setophaga petechia sonorana*), and summer tanagers (*Piranga rubra*) were confirmed breeding (Great Basin Bird Observatory 2017).

Table 1 shows the number of breeding territories of LCR MSCP covered species at the BLCA in FY16 (Great Basin Bird Observatory 2017).

Table 1.—Number of breeding territories per LCR MSCP covered species[1] at the BLCA, FY16

LCR MSCP covered species	Number of confirmed breeding pairs
Arizona bell's vireo	13.75
Sonoran yellow warbler	9.75
Summer tanager	5.5

[1] Number of breeding territories refers to the number of territories that are within the sampled area for pairs that were confirmed breeding. Partial territories are possible, as the amount of each territory within the sampled area was estimated to 0.25, 0.5, 0.75, or 1.0.

A bird banding station was operated 10 times from May 1 through July 30, 2016. Seven summer tanagers, two Sonoran yellow warblers, and two Arizona Bell's vireos were captured and fitted with color bands. Three yellow warblers were recaptured from an initial capture in previous years. Two Sonoran yellow warblers, one Arizona Bell's vireo, and three summer tanagers were resighted that had been captured in previous years (Dodge and Kahl, *in prep*.).

4.3 Small Mammal Monitoring

4.3.1 Bat Monitoring

Acoustic and capture survey methods were used to monitor bats in order to document the presence of species using the BLCA and to determine the age, sex, and reproductive status of bats that were captured.

4.3.1.1 Acoustic Surveys

One long-term monitoring station was operated at the BLCA during June, July, and August 2016. Western red bats (*Lasiurus blossevillii*), western yellow bats (*Lasiurus xanthinus*), and California leaf-nosed bats (*Macrotus californicus*) were detected (table 2). Table 2 summarizes the total number of nights the four LCR MSCP species were detected in FY16 (Mixan and Diamond, *in press*).

Table 2.—LCR MSCP bat detections by month at the BLCA, FY16

Month	Number of nights recorded	Total nights detected			
		Western red bat	Western yellow bat	California leaf-nosed bat	Pale Townsend's big-eared bat
June	30	4	0	2	0
July	31	5	3	0	0
August	31	4	1	0	0

4.3.1.2 Capture Surveys

Bats were captured with mist nets at the BLCA 1 night per month from June to August 2016. Seven California leaf-nosed bats were captured in July, and one Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens = Plecotus townsendii pallescens = C. townsendii townsendii*[1]) was captured in July (Hill 2018b).

4.3.2 Rodent Monitoring

Live trapping was conducted in the fall and spring of FY16 to determine the presence of Colorado River cotton rats (*Sigmodon arizonae plenus*). Sixty traps were set on transects at the BLCA for 1 night in fall and 1 night in spring. No Colorado River cotton rats were captured. Two desert pocket mice (*Chaetodipus penicillatus*) were captured in fall and one in spring; it is possible they were of the *sobrinus* subspecies based on range (Hill 2017, 2018a).

4.4 MacNeill's Sootywing Skipper Monitoring

Surveys for MacNeill's sootywing skippers (*Pholisora gracielae = Hesperopsis gracielae* [MacNeill]) were conducted in April, 2016. MacNeill's sootywing skippers were documented in the BLCA (Hill 2016).

[1] Genetic analyses on the pale Townsend's big-eared bat indicate that the lower Colorado River is likely in the range of the Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*) rather than the pale Townsend's big-eared bat (Piaggio and Perkins 2005). The bats recorded along the lower Colorado River will be referred to as pale Townsend's big-eared bats in this report, as the nomenclature change has not yet been verified by the USFWS.

5.0 HABITAT CREATION CONSERVATION MEASURE ACCOMPLISHMENT

5.1 Vegetation Monitoring

Vegetation data were collected in FY16 using light detection and ranging (lidar). Lidar measures the vegetation structure throughout the canopy and provides the ability to identify structural diversity and successional growth stages. Conservation area vegetation will be evaluated on a periodic basis using lidar to ensure the habitat is meeting species' requirements. A procedure to analyze and provide vegetation structure metrics will be developed, and the results will be presented in future reports.

5.2 Evaluation of Conservation Area Habitat

The Final Habitat Creation Conservation Measure Accomplishment Tracking Process was finalized in October 2011 (LCR MSCP 2011). All areas within the BLCA were designed to benefit covered species at the landscape level.

To meet species habitat creation requirements, the Habitat Conservation Plan (HCP) provides goals for habitat creation based on land cover types. These land cover types are described using the Anderson and Ohmart vegetation classification system (Anderson et al. 1976, 1984a and 1984b). Twelve species with habitat creation goals have creditable acres at the BLCA. These species, including their corresponding conservation measure acronyms, are: southwestern willow flycatcher (WIFL1), western red bat (WRBA2), western yellow bat (WYBA3), Colorado River cotton rat (CRCR2), yellow-billed cuckoo (YBCU1), elf owl (*Micrathene whitneyi*) (ELOW1), gilded flicker (*Colaptes chrysoides*) (GIFL1), Gila woodpecker (*Melanerpes uropygialis*) (GIWO1), vermilion flycatcher (*Pyrocephalus rubinus*) (VEFL1), Arizona Bell's vireo (BEVI1), Sonoran yellow warbler (YWAR1), and summer tanager (SUTA1) (table 3).

Table 3.—Species-specific habitat creation conservation measure creditable total acres for 2016

Species-specific habitat creation conservation measure	WIFL1	WRBA2	WYBA3	CRCR2	YBCU1	ELOW1	GIFL1	GIWO1	VEFL1	BEVI1	YWAR1	SUTA1
Creditable acres in 2016	0[1]	0	0	0	0	0	0	0	0	0	0	0
Total, including previous years	0	116	116	116	116	116	116	116	116	116	116	116

[1] Although the BLCA provides the appropriate structure type (cottonwood-willow I–IV) as defined in WIFL1 of the HCP, Reclamation is in the process of gathering the appropriate hydrologic data to determine saturated soils, moist soils, or slow-moving water. Once this has been determined, the BLCA will be evaluated.

6.0 ADAPTIVE MANAGEMENT RECOMMENDATIONS

Adaptive management relies on the initial receipt of new information, the analysis of that information, and the incorporation of the new information into the design and/or direction of future project work (LCR MSCP 2007). The Adaptive Management Program's role is to ensure habitat creation sites are biologically effective and fulfill the conservation measures outlined in the HCP for 26 covered species and if they potentially benefit 5 evaluation species. Post-development monitoring and species research results will be used to adaptively manage habitat creation sites after initial implementation. Once monitoring data are collected over a few years, and then analyzed for the BLCA, recommendations may be made through the adaptive management process for site improvements in the future.

There are no adaptive management recommendations for the BLCA at this time.

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